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SYSTEM AND METHOD FOR AUTOMATED SAMPLE INTRODUCTION

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Abstract

A method, system and apparatus for an automated sample introduction system, utilizing a demountable direct injection high efficiency nebulizer (d-DIHEN) is provided which incorporates an inductively coupled plasma optical emission spectrometer (ICP-OES) for the measurement of the phosphorus content in acid-digested nucleotides and deoxyribonucleic acid (DNA). The solution uptake rate and volume are reduced from 170 $\mu\text{L min}$ to 30 $\mu\text{L min}$ and 10mL to 2.4 mL, respectively, thereby reducing the required DNA sample mass for solutions containing 3 $\mu\text{g gP}$ from 300 μg to 72 μg DNA, in comparison to previous analyses in our lab using a glass, concentric nebulizer with cyclonic spray chamber arrangement. The use of direct injection also improves P (I) 213.617 nm sensitivity by a factor of 4 on average. A high performance (HP) methodology in combination with the previous sample introduction system and ICP-OES provides simultaneous, time-correlated internal standardization and drift correction resulting in relative expanded uncertainties (% U) for the P mass fractions in the range of 0.1 to 0.4 (95% confidence level) for most of the thymidine 5'-monophosphate (TMP), calf thymus DNA (CTDNA), and plasmid DNA (PLDNA) analyses. The d-DIHEN with HP-ICP-OES methodology allows for the quantification of DNA mass at P mass fractions as low as 0.5 $\mu\text{g g}$, further reducing the required DNA mass to 12 μg , with small uncertainty (less than 0.4 %). The present method, system and apparatus can aide in the development and certification of nucleic acid certified reference materials (CRMs), particularly for these samples taht are typically limited in volume.

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References

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Status of Availability

This invention is available for licensing exclusively or non-exclusively in any field of use.

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